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COMMUNICATIONS

TRACHOMA AMONG THE CHINESE IN FRANCE

BY

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IN the early part of 1917 the first drafts of Chinese recruited as voluntary labourers by the British Government began to arrive in France. On reaching the Depôt of the Chinese Labour Corps each draft of men was subjected to a routine medical inspection which included the examination of the everted lids. It was found that 10 to 15 per cent. of these early drafts were affected with trachoma.

Remembering the disastrous experience of Napoleon's army in Egypt, in 1798, and the widespread dissemination of trachoma among the civilian population of Europe by his soldiers on their return, the Consulting Ophthalmic Surgeon of the B.E.F. in France, Colonel W. T. Lister, C.M.G., A.M.S., realized the grave menace to the health of the white troops and civilian population in France, if these heavily infected companies were allowed to mingle at all freely with them. Moreover, it was evident that unless immediate

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steps were taken to separate the men with trachoma from their uninfected companions, there would be a rapid spread of the disease and the whole body of men would be to a great extent handicapped in the performance of the work for which they had been recruited.

Classification

For purposes of segregation and administration the Chinese were divided at the initial examination in France into three classes.

(1) "X"—men with healthy conjunctivae, free from all suspicion of trachoma.

(2) "*Z*"—cases of manifest trachoma.

(3) "Y"—cases of chronic conjunctivitis, forming the borderland between "X" and "*Z*"—This group included cases of inflamed and altered conjunctiva in which it was impossible to tell at a single observation whether they were trachoma-free or not.

With regard to the disposal of the men with trachoma, it was obviously inadvisable to repatriate so large a body of men who, apart from their eye disease, were in splendid physical condition. It was decided to form separate "*Z*" companies, to be composed entirely of men suffering from trachoma. These "*Z*" companies were sent to special "Ophthalmic treatment centres" at Calais, Boulogne, Etaples, and a few other places, in which they were constantly under supervision and treatment by ophthalmic specialists. Great care was taken to insure that their quarters were entirely separate from those of any other unit.

The men classified "Y" were kept under treatment at the hospital for a week or ten days. A number of them cleared up under treatment and were discharged as clean—"X." Some, as the associated conjunctivitis subsided, showed evidence of trachoma and were accordingly drafted into a "*Z*" company. Others remained in an indeterminate condition; as limitation of accommodation prevented their being retained longer in hospital, they were formed into "Y" companies. These "Y" companies were also sent to ophthalmic treatment centres for treatment and further observation.

Origin

Each coolie had been medically examined in China before embarkation; trachoma was the principal reason for the rejection of the men declined as unfit. Unfortunately the examining doctors in China were constantly changed, and there was therefore a varying standard of requirement for a "clean" eye, as well as a varying degree of experience in the detection of trachoma.

In each shipment there was a small number of impersonators who by "ways that are dark and tricks that are vain" contrived to elude the vigilance of the authorities; these formed one source of infection.

In addition there were necessarily a few cases which were infected before examination, but had not developed any signs of the disease which could be identified; these developed the typical granules on the journey to France.

But by far the most important source of infection was the case of chronic trachoma with a scarred and altered conjunctiva which, at the time of examination in China, was apparently quiescent. Shipboard life on a crowded transport provides ideal conditions for the lighting up of such a case to an inflamed and highly infective state, and for the rapid transfer of the disease to his immediate associates by the use of the common wash basin and the friendly exchange of towels.

One of the most striking features of the examinations in France has been the clear evidence of the infectivity of trachoma. The men came to us approximately in the order in which they were arranged on board ship. Again and again we have had a long string of men without a single case of manifest trachoma and then suddenly we came upon a series of five or six men all of whom were infected with trachoma. Almost always it was possible to pick out from among these men the one who was the source of infection; the conjunctiva tarsi marked by lines of white scar tissue and the intervening spaces standing out red and swollen. The other cases in the group were in the earliest stage where the trachoma granules just show as faint "ghosts" through the injected conjunctiva over the tarsal plate.

The voyage from China to France occupied about six weeks. This evidently provided sufficient time for the incubation of the disease and its development to a stage when it was easily recognizable.

Percentages

In the early drafts of coolies it was found that from 10 per cent. to 15 per cent. were suffering from trachoma when they arrived in France.

A further 20 per cent. to 25 per cent. of "conjunctivitis" were detained in hospital for treatment and observation. At least one half of these latter cleared up within a week, under treatment with zinc sulphate and boric acid drops, sufficiently to warrant their discharge as trachoma-free. Some 20 per cent. of them, as the associated conjunctivitis subsided, displayed the marks of trachoma and were drafted into "*Z*" companies. The balance were drafted into "Y" companies.

As soon as the heavy incidence of trachoma in the early drafts was recognised, a telegram was sent to the recruiting centres in China with instructions to require a stricter examination of the

eyes of the recruits, and to reject all men suffering from conjunctivitis. A routine application of the standard drops: Zinc. sulph. gr. 2, Ac. boric gr. 10, Aq. ad. oz. 1—was ordered to be made daily during the voyage to the eyes of all the coolies. The result of these more stringent precautions was a marked improvement in later drafts. The trachoma rate sank to 3 per cent., and sometimes as low as 1·6 per cent., while the conjunctivitis rate was about 10 per cent.

Method of examination

Each upper lid was fully everted. A marked feature of the examinations was the entire absence of symptoms in most of the cases of trachoma which were discovered. If eyes, which appear clean as far as external appearances are concerned, were passed without further examination, at least 90 per cent. of the cases would escape.

The method of eversion should be one in which soiling of the conjunctiva by contact with the fingers and the wholesale epilation of lashes are avoided. Where large numbers of men are to be examined, it must also be rapid and easily applicable to all sorts and conditions of lids.

The method used by one of us was as follows: Place the thumb of the right hand on the lower lid and grasp the skin of the upper lid between the thumb and second finger of the left hand. The patient is told to look down or to shut his eyes. A quick rolling motion backwards of the finger on the thumb everts the upper lid, and a pull downwards at the same time with the thumb on the lower lid exposes the inner surface of that lid and helps with the eversion of the upper lid. For the left eye the hands are reversed.

Another method of eversion was uniformly used by one of us. With the left hand resting on the forehead, the left thumb is placed on the upper lid, as close to the ciliary margin as possible; this is then drawn upwards to its extreme limit. The forefinger of the right hand is placed on the lower lid and by a rapid lateral movement of the forefinger, the whole lid is made to slide outwards across and in contact with the globe; some slight backward pressure being occasionally necessary. Simultaneously the left thumb is moved outwards a little and the upper lid then everts itself with a curl and a flick. One advantage of this method is that the more the patient resists, the more easily is the eversion accomplished. A disadvantage is that the final flick of the eversion is accompanied by a spurt of discharge from the eye (if any be present); hence the examiner should always wear goggles as a protection.

The upper lid must be thrown well over and particular attention paid to the outer and inner angles and to the convex border of the

tarsus. By moving the hand holding the upper lid first to one side and then towards the other, each angle can be smoothed out and carefully examined. Pressure backwards on the everted upper lid with a pull upwards will generally expose the conjunctiva of the upper fornix; as a rule in the Chinese the conjunctiva of the fornices is unusually redundant.

In order to detect the earliest stages of trachoma, it is essential to have a good light. Our examinations were always conducted out of doors in order that we might have direct sunlight. The examiner stood with his back to the sun, so that the light might come over either shoulder directly on to the eyes of the patient.

In everting the lid the use of force should be avoided as far as possible. If force is used, or the patient strains, the conjunctiva is rendered anaemic, and the trachoma granules do not show up by contrast; where force is necessary, time should be given for the blood to return to the conjunctiva before a decision is made. On the other hand, prolonged exposure to the atmosphere produces hyperaemia, and the real appearance is obscured.

As a rule, the best judgment can be given on the appearance of the lids when first everted.

Handling of the conjunctiva should be avoided. The edge of the lower lid may sometimes be pushed beneath the tarsal margin of the everted upper lid in order to expose it more fully. Occasionally it may be necessary to grasp the tarsus of the everted lid and partially evert again, in order to expose the depths of the upper fornix.

We found that the three of us were able to examine in a little over an hour 500 men from a draft with a heavy infection of trachoma, which necessitated frequent stoppages to send the rejected man to the proper collecting station, and to wash the hands before proceeding with the examination. In less heavily infected drafts, and with greater experience, we dealt with 750 men in one hour. One of us completed the re-examination of a " clean " company of 450 men in 50 minutes.

Diagnosis

The nature of the specific cause of trachoma is unknown, and we are still dependent on clinical evidence for diagnosis.

It is well to recall the natural course of the disease.

(1) In the early stages there are formed in the palpebral conjunctiva and fornices the ***trachoma granules***, which microscopically exhibit the structure of lymphoid follicles. At this stage there is very little associated conjunctivitis, and the patient has little or no discomfort.

(2) Later there is more or less active vascular reaction of the

conjunctiva, with a luxuriant formation of *papillae*, due to the folding of the inflamed and hypertrophied mucous membrane. In this stage there is a certain amount of purulent discharge. The patients feel considerable inconvenience from the obscuring of vision by the discharge, and the feeling of weight and grittiness in the lid.

(3) Finally the follicles become absorbed or softened and extrude their contents on the surface. Their disappearance is associated with, and in part is due to, the development of fibrous tissue which produces *cicatrization* of the conjunctival surface of the lid.

A complication in the cornea which occurs in some cases during the latter two stages is *pannus*.

Therefore trachoma in the Chinese may be diagnosed or should be suspected if any of the following signs are present:

(1) Granules in the conjunctiva,
(2) Papillae in the conjunctiva,
(3) Vascularization of the cornea,
(4) Cicatrization in the conjunctiva.

Before dealing with these seriatim we should like to emphasize our conviction that it is impossible to be sure of the presence or absence of trachoma while the patient has acute catarrhal inflammation and considerable discharge from the eye. Quite often such eyes have a distinctly granular appearance of the conjunctiva; the conjunctival inflammation must first be abated and then an examination can determine whether trachoma is, or is not present, in addition. On several occasions we have seen cases marked by an examiner as "severe trachoma" clear up entirely after ten days' treatment with zinc and boric lotion.

(1) *Granules.* The usual text-book description of trachoma granules is "grey, translucent, roundish granules—found principally in the retro-tarsal folds" (Fuchs). This is by no means the form generally found in the early stages of the disease in Chinese. The retrotarsal folds are, as a rule, affected only in the later stages of the affection. Granules answering to the above description are more often seen in the conjunctiva on the convex edge of the tarsus. In the Chinese the granules most frequently appear scattered over the tarsus as small round cream-coloured points with an opalescent sheen which shew up distinctly in comparison with the hyperaemic conjunctiva. If there is much swelling of the conjunctiva, these deeply placed granules are often obscured; only when this swelling subsides under treatment, do they become visible and provide grounds for a diagnosis.

Translucent granules appearing in the lower lid, either in the fornix or near the margin of the lid, with no evidence of trachoma in the upper lid may generally be regarded as due to follicular conjunctivitis. Of course there is a remote possibility of trachoma

occurring in the lower lid alone. Only the effects of treatment can finally decide; if they prove resistant to ordinary treatment and spread to the upper lid, it would point to trachoma as the correct diagnosis.

Atropin irritation may produce lymph follicles in the retrotarsal folds which may lead to the suspicion of trachoma. They clear up rapidly when the use of the drug is discontinued.

(2) *Papillae* are formed by the folding of the inflamed and hypertrophied mucous membrane. They are not peculiar to trachoma, but are apt to present themselves in any chronic inflammation of the conjunctiva.

In a well marked case they stand out as raspberry-like projections; when less marked they impart a velvety appearance to the palpebral conjunctiva.

In the Chinese well-marked papillae, *apart from profuse discharge* from the eye, are practically pathognomonic of trachoma. A velvety appearance is suspicious, but not definite; treatment with astringents must be used to reduce the swelling of the conjunctiva and allow the trachoma granules, if present, to appear, before a decision can be arrived at.

A fine stippled appearance of the conjunctiva (as if it had been struck with the bristles of a hair brush) is almost always due to a simple chronic conjunctivitis and clears up gradually under the use of a zinc lotion.

The most difficult cases to diagnose are those in which there are a few small raised points on the outer or inner angles of the everted upper lid—that is in the part of the conjunctiva which lies between the outer or inner limit of the tarsal plate and the corresponding angle of the eye. Quite frequently one or two fine raised points are seen on these small areas which can be distinguished by looking obliquely at the lid. At times these points have the appearance of small trachoma granules. We have come to regard these as suspicious, but not definite, so long as they are confined to these areas; if they encroach on the conjunctiva over the tarsal plate, we classify them as early trachoma. We are inclined to the opinion that these angles are in many cases the starting points of the disease.

(3) *Vascularization of the cornea.*—Pannus in the Chinese is pathognomonic of trachoma. It begins in, and is usually confined to, the upper part of the cornea.

The limited vascularization due to an ulcer of the cornea, must, of course, be excluded; as must also the deeper vascularization due to interstitial keratitis.

(4) *Cicatrization.*—The cicatrices of old trachoma appear as narrow whitish striae in the midst of the red and thickened conjunctiva of the upper lid. They run chiefly in the

longitudinal direction, more or less parallel to the lid margin. Later there are intersecting striae which form a network, the interstices being occupied by red islands of inflamed and thickened conjunctiva.

The final condition is that in which the conjunctiva by contraction of the scar tissue has become perfectly pale, thin, and smooth, with generally a faint bluish tinge.

Short of the final stage we have rejected all cases with typical trachoma scars, because, until that stage is reached, it is impossible to be certain that quiescent cases will not relapse.

In conclusion we may say that at field examinations we feel confident in passing as trachoma-free any cases in which the Meibomian glands and ducts can be seen showing over the whole surface of the tarsal plate, and in which the normal vessels can be traced throughout their course in the conjunctiva tarsi. Any swelling which obscures the ducts and vessels calls for more careful inspection to see whether any of the above manifestations are present.

Differential Diagnosis

A few words may be added upon conditions which may lead to some hesitation in pronouncing a case free from trachoma.

(1) *Follicular conjunctivitis.*—This has already been dealt with above under "granules." In the Chinese a translucent granule in the lid is most likely to be trachoma, just as in Europeans the probabilities lie the other way. In follicular conjunctivitis the follicles predominate in the lower lids, are more elevated, more clearly domed and jelly-like, and are arranged more in rows like strings of pearls.

(2) *Chalazion.*—A small chalazion may rarely be mistaken for a trachoma granule; the colour seen through the conjunctiva is dull grey, and palpation between the thumb and finger shows the thickening of the lid at that point.

The granulation tissue protruding from a ruptured chalazion might be mistaken for papillae. Cicatrices left by numerous healed chalazia may simulate the cicatrices of trachoma.

Mere mention of these conditions is sufficient; a careful examination readily distinguishes them from trachoma.

(3) *Calcareous spots.*—These are frequently seen in the conjunctiva tarsi. They are whiter than trachoma granules and are often irregular in shape.

(4) A varicose condition of the upper fornix is not uncommon in the Chinese. The veins are enlarged and tortuous, and bulge the conjunctiva outwards at the bend of the vessels. If there is general injection of the conjunctiva, these points have sometimes the appearance of granules in the fornix.

(5) *Conjunctivitis vernalis.*—This is very rare in the Chinese.

If the granulations in the lids present the flattened, tesselated and pale opalescent appearance which suggests this disease, the conjunctival secretion should be examined to see whether it is rich in eosinophil cells, which sign would point to spring catarrh.

(6) *Tuberculosis of the conjunctiva (chronic hypertrophic).*—This is a rare disease. It more often affects the lower than the upper lid. Pannus is sometimes present, but is generally more marked over the lower half of the cornea to correspond with the more usually affected lid. Usually it is accompanied by cervical or preauricular adenitis and there are generally other tuberculous lesions in the body.

Bacteriology of Associated Conjunctivitis

A bacteriological examination by Capt. H. D. Matthews, Bacteriologist of this hospital, of smears from 152 cases of "conjunctivitis" rejected at one inspection, gave the following results :—

No organisms found	68
Weeks's bacillus	25
Diplobacillus of Morax	52
Bacillus xerosis	17
Staphylococcus	1

Treatment

During two years trachoma cases were daily under treatment in this hospital, and every week were being drafted through it to trachoma centres elsewhere. They may be said to fall into three classes :

(1) Those with subjective and objective *symptoms.*

(2) Those without symptoms but with *diagnostic evidence* of trachoma.

(3) Those either cured or with a mistaken diagnosis.

Class 1. The patients suffered from photophobia, lacrimation, and conjunctivitis, and presented on examination manifest signs of trachoma and sometimes its conjunctival and corneal complications. They were unfit for work and usually themselves complained of "sore eyes." This voluntary admission was noteworthy and at once placed the case in the class for active treatment ; for, as a rule, the Chinese are not hypersensitive as regards their conjunctival sacs and can comfortably carry therein a foreign body or two without requiring attention.

Soon after the acute symptoms had cleared up, these patients were drafted off to trachoma centres in different parts of the country, where treatment in some form was continued without interfering with their daily work.

In *Class 2* showing definite trachoma without symptoms, we usually abstained from any active interference, being content with two or three days' mild treatment, such as protargol 5 per cent. three times a day, before sending them out to trachoma centres. We are convinced that for an indefinite period the disease in some of this class is arrested and will remain quiescent unless interrupted by injudicious treatment or by a long spell of working under dusty conditions. Pushing the treatment in these cases is an error likely to set up the complications described later.

In *Class 3*, allowing for a small proportion of errors in diagnosis, we had sufficient evidence in cases returning to hospital for other reasons from trachoma centres that numbers of undoubted cases became apparently cured; the question of immunity from future relapses, however, being always in doubt.

Our routine treatment in cases with acute symptoms was to paint the everted lids daily with silver nitrate 2 per cent. solution; when the inflammation and discharge had been checked and only the chronic trachomatous process remained, the lid was stimulated by the use of copper sulphate. Our rule of thumb has been: silver nitrate for acute, and copper sulphate for chronic cases.

For acute symptoms there is no more valuable medicament than silver nitrate 2 per cent. solution painted on the everted lids with a pledget of cotton wool once a day; the excess may be washed off with normal saline solution, but this is not really necessary. Under this treatment the acute symptoms subside within a week or ten days.

If the follicles in the lids are large and numerous, they should be expressed under cocain with Grady's forceps after a preliminary light scarification of the conjunctiva with a sharp knife. Silver nitrate 2 per cent. may be painted on the lids immediately after expression and applied daily thereafter. A cold compress on the eyes for a few hours after expression relieves the pain which is sometimes considerable.

When the acute symptoms have abated, the use of the copper sulphate crystal or lapis divinis stick, is the most effective agent in dealing with the trachomatous infection. The effect produced must be carefully watched, and if the eye shows signs of irritation and increased inflammation or if corneal ulcers appear, the copper sulphate should be abandoned temporarily in favour of milder measures. Corneal ulceration is always a contra-indication to the use of copper sulphate. Usually a case of trachoma in the chronic stage will tolerate and improve under a daily application of copper sulphate to the everted lid; it should be lightly rubbed over the conjunctiva and the excess washed off with boric lotion.

One of us (C.A.H.) after prolonged use of the copper sulphate crystal is less in favour of it. As usually applied, he believes it

produces an unequal and irregular scarring such as nature in its process of cure seldom does, and hence that the use of the crystal conduces to the complications of buckling of the tarsal plate and trichiasis. He prefers the daily use of copper sulphate drops—gr. 1 to the ounce—which gives an evenly distributed summation of caustic stimuli of safe degree and easy application.

For a change of treatment glyc. ac. tannic (1 in 8, *i.e.* half the B.P. strength) is very useful.

A great number of mild cases safely undergo spontaneous cure and continue their daily work without interruption from corneal complications under the daily use of zinc and boric lotion and protargol 5 per cent. (or, better still, protosil, which does not stain the conjunctiva).

With reference to the treatment of sequelae, we have tried most of the operations for entropion, but give preference to the method of splitting the lid margin, and grafting in the V-shaped marginal slit a strip of buccal mucosa. The graft adheres without stitches if the bleeding is arrested before it is applied. This method, which allows the lid to adapt itself to the curve of the globe, gave in our hands the best results. If the ptosis is marked we remove, in addition, a strip of the skin and underlying tissue of the lid, and anchor the lower edge of the skin incision to the upper margin of the tarsal cartilage, thus drawing the lash-bearing border upwards and turning the lashes outwards.

Prophylactic Treatment

The daily instillation of zinc and boric drops was ordered for every Chinese company in France, whether "X," "Y," or "Z." The usual method of application was as follows: The coolies squatted down in rows. An orderly, passing down the row behind the men, grasped each man's head, turning the face upwards, and resting the head against his body; he was able to draw the upper lids upwards, while the coolie himself pulled the lower lids downwards. A dresser, passing in front of the line with a pen-filler full of the drops, instilled a drop or two into the widely-opened eyes. By this method a company of 500 men could be treated in 20 minutes.

It is evident that such treatment was necessary in "*Z*" and "Y" companies, in addition to special treatment for the more serious cases. It was also of great value in "clean" companies, in keeping down the chronic conjunctivitis which is so common among the Chinese, and thus of lessening the danger of infection from sporadic cases of trachoma which might develop in the company.

It was also ordered that all face-towels should be sterilized by boiling twice a week. This order was designed to cope with the most frequent channel of infection from man to man, and also controlled the constant auto-infection of the owner of the towel.

Periodical inspections in the field of all "clean" companies were undertaken, in order to detect and remove to "*Z*" companies any cases of trachoma which had escaped detection at the first examination, and had developed subsequently.

These measures were extraordinarily successful in keeping down eye disease among the Chinese, and in minimizing the number of men off work from eye trouble. The number of men unable to work from this cause was infinitesimal; the average number of men off duty was between 0·025 and 0·09 per cent., and this was the same in the "*Z*" and "X" companies alike.

The freedom of the men affected with trachoma from serious complications, the prevention of the spread of the disease to the whole body of Chinese labourers, and the reduction of labour wastage from eye disease to such minute proportions, together constitute a noteworthy achievement in preventive medicine.

Even more important than this is the highly gratifying result that in no case, as far as we know, was the infection transferred to any white soldier or civilian from the large number of Chinese labourers suffering from trachoma.

Moreover, these Chinese themselves, as a result of the constant treatment and the education in ophthalmic hygiene, are in a very much better condition than they would have been if the disease had run its usual untreated course in their homeland. The ordinary sequelae—pannus, corneal ulceration, trichiasis and entropion (often culminating in blindness in one or both eyes) which are so terribly common in China, were very rare in these men. Not more than ten out of the body of eight thousand men in trachoma companies were repatriated on account of complications which disabled them from work.

We desire, in conclusion, to acknowledge the constant help given us in our work by Colonel W. T. Lister, Ophthalmic Consultant to the B.E.F., France, and by Lieutenant-Colonel G. D. Gray, the Commanding Officer of No. 3, Native Labour General Hospital, and their kind permission to publish the above record of our experience.

PERFORATING WOUNDS OF THE EYE

An investigation of 106 cases occurring in Soldiers at a Military Ophthalmic Centre in London

BY

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IN investigating these cases it is necessary to bear in mind that they only represent perforating wounds of a certain degree of

severity, cases in which the eye has not been so severely injured as to necessitate its immediate removal; in the latter cases the eye has, of course, been removed before the patient reaches England. These patients under consideration had all been sent to the 2nd London General Hospital and the large majority of all the perforating wounds of the globe that were sent to that Hospital are included in these figures; the number of cases is surprisingly small considering that up to June, 1918, this Hospital was the only Military one in London with special ophthalmic beds, and I think it indicates that in most cases, if a missile in this war penetrated an eye, the eye was so severely injured that it had to be excised as soon as possible.

In 58 cases the left eye was penetrated and in 48 the right eye.

In 24 of the 106 cases a foreign body was removed with a magnet, in the majority of cases a Haab magnet, before the men left France; but a number of foreign bodies were successfully removed with the ring magnet after the cases reached England. Of these 24 eyes which had foreign bodies removed, 4 were subsequently excised before leaving hospital; 6 regained some useful vision varying from 3/60 to 6/9; the other 14 were practically blind but remained quiet, and therefore better, from a cosmetic point of view, to the patient than an artificial eye.

Of the remaining 82 eyes, X-ray reports of 48 gave a negative result in 14 and a positive result in 34, of which the foreign body was extraocular in 12 and intraocular in 22 cases. Of these 22, the eye was excised in 9 cases at intervals varying from 6 to 38 days after injury, with one exception when the eye was removed 17 months after injury on account of pain: of the remaining 13, 9 left hospital with the eyes quiet but vision of perception of light only and mostly with low tension; 1 died after an operation on the lower jaw, leaving 3 eyes containing foreign bodies with vision as follows, 3/60, 6/36 (foreign body seen in vitreous with ophthalmoscope) and 6/9 (minute foreign body lying on the iris); in these 3 cases the foreign bodies were of course non-magnetizable.

In 7 cases where the foreign body had penetrated both walls of the globe and was lying in the orbit, none had to be excised before the men left hospital, but the best vision recorded was "fingers at 3 feet."

Seat of Perforation. Wholly within cornea 36, corneo-scleral margin (limbal) 37, sclera 28, not mentioned 5. Of the 36 corneal perforations, 14 got vision between 6/60 and 6/6, that is, 39 per cent. with useful vision.

Of the 37 corneo-scleral perforations only 4 got vision between 6/36 and 6/12, that is, just under 11 per cent. with useful vision.

Of the 28 scleral perforations, 7 got vision between 6/60 and 6/9, that is 25 per cent. with useful vision.

These figures go to confirm the view previously held that wounds in the corneo-scleral region give a less favourable prognosis than wounds of other parts of the globe, and in this respect resemble perforating wounds that occur in civil life: the number of eyes requiring subsequent excision is greater, and the number of eyes regaining useful vision is less in these limbal perforations.

The corneal perforations tend to give the most favourable prognosis, and the scleral perforations take a place exactly equidistant between the corneal and limbal cases in these figures as regards recovery of useful vision.

Injury to lens.—44 cases, 7 of which were in cases of scleral perforation; of these 7, 4 appeared to be concussion cataracts and were very incomplete, a good red reflex remaining all the time the men were under observation, although it is probable that these lenses will eventually become completely opaque; of the other 3, in 2 cases the cataract was due to direct injury, and the other was merely blood-stained deposits on the back of the lens associated with much vitreous haemorrhage, and therefore not a true lens injury.

The other 37 cases were almost all due to direct injury to the lens; a definite Vossius ring was noticed in one or two patients.

When these men left hospital only 7 of them had vision of 6/60 or better, but, no doubt, in a number of the cases subsequent needlings would improve the vision, for the majority left hospital before the eyes were sufficiently quiet to warrant any operative interference, it being considered inadvisable to needle these cases for at least six or nine months after injury as a general rule. Of the 7 with useful vision, all but one had been needled.

Prolapse of iris.—There were 50 cases with this complication, of which 12 came to excision of the eye, and 11 obtained vision between 6/60 and 6/9, that is, 22 per cent. regained useful vision, a somewhat high percentage for this dangerous complication, and due no doubt to the prompt attention that many of them received in France, the prolapsed iris being excised in nearly all cases as soon as possible.

Enucleation.—In 25 cases:—4 perforation scleral, 14 per cent of the scleral cases: 10 perforation limbal, 27 per cent. of the limbal cases: 7 perforation corneal, 19 per cent. of the corneal cases.

Nature of accident.—67 due to explosion of shell and splinters hitting eye; 19 due to accidents such as occur in civil life; 9 due to bursting of hand bomb or rifle grenade; 7 due to detonators; 4 due to ricochet of fragments of metal from bullets, or to pieces of stone, earth, etc., striking the eye after being hit by a bullet; probably also some of the 67 mentioned as due to shell explosion were caused in this way.

To consider the 19 accidental injuries, 6 occurred while the

men were chopping wood for incinerators, and in at least one case the man was using his bayonet for the purpose!; two were cases of rupture of the globe from a blow by a man's fist; the others mostly due to small pieces of metal flying into the eye while using hammer, chisel, pick, etc., and one or two to ends of barbed wire catching the eye. In these 19 cases where the force of the penetrating body was not very great, one would expect to get better results than in the other cases, where the penetrating body being in most cases a fragment of shell, would be travelling with great force, sufficient in several cases to perforate both walls of the globe and to come to rest behind it in the orbit. This view is to some extent borne out by the figures, which show 7 out of the 19 accident cases getting vision between 6/60 and 6/9, 37 per cent.; whereas of the other 87 shell cases, 17 obtained the same degree of vision, just under 20 per cent. Of the 19 cases, 4 were excised, two of them owing to panophthalmitis.

Sympathetic ophthalmia.—These 106 cases support the opinion now generally held that the risk of this disease supervening on perforations of the globe is very slight; the cases that have occurred as the result of injuries in this war are remarkably few, and I think I am right in saying that only one other case, beside the one in this series about to be described, has occurred in this hospital out of several thousand eye casualties admitted here from abroad.

Details of this case, No. 82, may be worth while recording: the boy was a lance-corporal, aged 19, wounded by a fragment of shell penetrating the right eye on March 31, 1918; the wound of entrance in the ciliary region at 12 o'clock, with prolapse of the iris. Three days after the injury the prolapsed iris was excised and a stitch put in a tear in the conjunctiva. The surgeon in France made the following note on the field card: "Foreign body passed through the ciliary region and is now in the orbit; question of enucleation to prevent sympathetic ophthalmia left for surgeon in United Kingdom. Vision—No P.L." The day before the iridectomy, that is, two days after injury, Descemet's membrane was covered with fine white spots of "keratitis punctata."

The first note after his arrival in England is on April 14, 1918, R.V. 4/60: eye injected but not painful, anterior chamber shallow, tension —1. Vitreous haemorrhage. L.V. 6/5. May 5, a note is made that the eye is quiet and the man is to be "categorised": on May 17, circumcorneal injection appeared in the left eye and some pain was complained of in that eye; a few doubtful spots of "keratitis punctata" were seen. The right eye was immediately excised on the 47th day after the injury. The following day intravenous galyl was given, and subsequently six other injections at intervals of about a fortnight, which unfortunately did not prevent a severe attack of iridocyclitis, lasting some four months, which reduced vision to "hand move-

ments " with subsequent improvement to about 1/60 in a good light.* It was thought that the galyl had some beneficial effect in checking the disease, and the following additional remedies were all tried without any great success: Locally, atropin followed by eserin on account of the rise of tension, and later, dionin, hot fomentations and compresses, leeches to the temple, massage through the closed lids in the later stages: by mouth, salicylates for a mouth followed by perchloride of mercury, together with mercurial inunctions, and later hypodermic injections of pilocarpine in increasing doses daily, for ten days. Eventually the active trouble slowly subsided, the injection and pain disappeared, and when last seen in February, 1919, the eye was quite quiet, tension about normal; there was a partial red reflex and he could just see to read and write letters in a good light: the chief cause of the poor vision then appeared to be organised inflammatory exudate in the pupil. No definite " keratitis punctata " ever appeared in this eye.

I wish, in conclusion, to thank Major A. W. Ormond for putting these cases at my disposal.

AN EPIDEMIC OF MACULAR KERATITIS

BY

H. KIRKPATRICK,

MADRAS.

CASES of a peculiar form of keratitis have been seen for the past eighteen months in Madras with increasing frequency until in September of this year the disease has assumed an epidemic character, two or three fresh cases being met with every day.

The type of keratitis somewhat resembles superficial punctate keratitis, but differs in some respects from descriptions of that disease, being distinctly more macular than punctate in character. It has taken three main forms in all of which the opacity appears to be situated in the superficial layers of the substantia propria, Bowman's membrane, and the deeper layers of the corneal epithelium. In none of these does the corneal surface stain with fluorescin.

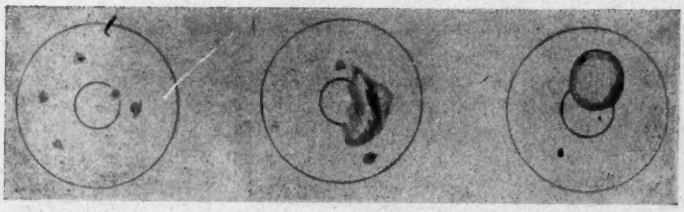
The symptoms complained of are loss of vision, the appearance of a white spot on the cornea, and occasionally lacrimation and irritation.

The first type is a superficial punctate keratitis and in it small

*Since the foregoing was written the patient has been seen on August 28, 1919. V. was then " fingers at 3 feet," eye not injected but painful at intervals; anterior chamber almost non-existent, tension raised, partial red reflex. I fear that he will probably lose what vision he has owing to the secondary glaucoma.

opaque spots, varying in size from a pin point to a large pin's head, are seen dotted irregularly over the surface of the cornea. These number from three to twelve and do not appear to be more common in one part of the cornea than another. The patient naturally complains more when a spot is situated in the pupillary area, and some irritation may be present, should one lie near the limbus. The spots usually have a soft edge and seldom show any elevation of the surface; any loss of polish is rare. The absence of any vascular reaction, either conjunctival or circumcorneal, is astonishing.

Intermediate between I and II.



No. 1. No. 2. No. 3.

In the second type a large patch is found, the general punctate character being lost. This nearly always shows a denser part which is often linear and sometimes raised, and from this the soft opacity fades away into the healthy tissue on either side. The

patch is often shaped like the nucleus of a myelocyte, the indentation being placed on the fainter edge. One or two soft detached spots are frequently found in the neighbourhood of the large area and occasionally a small spot may be seen at some distance from it. The size of the large patch generally is as large as a quadrant of the cornea. In the later stages the surface of the area usually becomes dulled. This type is the one most frequently met with.

The third type shows a single spot only; this is dense, sharply circumscribed, and often slightly raised. Its surface may lose its polish at a fairly early stage and slight vascularization may occur if it is placed near the limbus. Its edges are denser and more distinctly raised than the centre. It causes more irritation than the other types and is more obstinate in clearing up. The patch is generally smaller than that found in the second type.

In none of these types is it possible to say that one part of the cornea is more affected than another, although in the second and third forms, the edge of a lid sometimes corresponds to a border of the opaque area. The lids and conjunctiva are perfectly normal and free from congestion as a rule, but occasionally there may be some slight congestion in the last two types; still this absence of vascularity is most surprising and is one of the striking features of the disease. It is very rare for the disease to attack more than one eye.

No opportunity to obtain a specimen of the entire thickness of the cornea in an affected area has yet occurred, but deep scrapings have been made frequently. From these and from the general appearances it is evident that only the superficial structures of the cornea are involved. Major Cunningham, I.M.S., of the King's Institute of Preventive Medicine, has kindly made several examinations of these scrapings, and numerous cultures have been made by him and his staff, but all have proved negative bacteriologically and in no case have organisms resembling those described by Herbert* in Bombay, or any other variety, been found. Inflammatory cells are exceedingly scarce in the specimens and the only definite change seen hitherto is the presence of numerous small granules in many of the epithelial cells. These granules often seem to be of a very faint brown tinge and are extranuclear but arranged around the nucleus and in close contact with it.

As a rule the opacities have been found to be very slow in clearing, but their duration is variable; some of the first or punctate variety have cleared in two or three weeks, whereas some cases of the third type have been under observation for over a year and, though considerable absorption has taken place, have not completely cleared yet. A local superficial necrosis is occasionally seen in the late stages of the two last varieties, but no secondary infection with corneal ulceration has occurred up to date.

Ophthal. Rev., 1901, p. 339.

The disease has been met with in all classes of the population—well-to-do Indians, coolies, workmen of all classes, merchants, and Europeans of good station. Age does not appear to have any influence in its causation, although it has been seen most frequently between 25 and 45. Considerably more men than women have been attacked, but the male out-patients always outnumber the female. Patients have not come from any one house or street, nor does any one part of the town appear to be specially affected. No case coming from outside the Madras area has been seen as yet. Some of the Madras streets have been tarred recently, but most patients have not lived in the vicinity of such roads, nor have they passed along them on their way to work. The patients have all appeared to be in reasonably good health, and though many have suffered from influenza, the proportion of such is no greater than might have been anticipated in view of the wide-spread character of the recent epidemic. No association with any other general disease has been apparent and the epidemic has not been accompanied by any rise in frequency of herpetic conditions of the cornea.

The salient features in the aetiology of the disease are: first, that the number of cases met with is sufficient to constitute a mild epidemic; secondly, the apparent absence of bacteria or other organisms; thirdly, the singular lack of local reaction; fourthly, the apparent absence of contagion (so far I have not known a patient admit that another member of his household is or has been affected nor have any of the Hospital staff been attacked); fifthly, its uniocular character; sixthly, the absence of any general disease or constitutional defect in patients attacked. Thus it will be seen that the problem is not a very easy one to solve. Presumably the cause is either parasitic or nutritional. Its uniocular character and the general good health of the patients make it difficult to believe that it is nutritional. If parasitic it is unlikely to be bacterial as some bacterial organism would probably have been found in the fresh or stained specimens examined, or in one of the numerous cultures made, and, under the circumstances, I can only suggest that protozoa which have escaped observation may be the cause of the disease.

Many different drugs and forms of treatment have been tried, but as yet no useful specific line of treatment has been discovered. Some of the better class of patients have benefited by change of air, but this had no effect upon others. Ethylhydrocuprein and quinine have apparently been of use occasionally, but in other cases have had no effect. Lymphagogue treatment has been tried extensively, but has been disappointing on the whole. The routine treatment now adopted is the use of eyebaths of magnesium sulphate in concentrated solution, combined with exposure of the

area to the heat of the actual cautery, which is approached as close as possible to the surface of the cornea without actually touching it; the cautery should be held in position long enough to excite a mild reaction.

I have only been able to find very scanty descriptions of the disease described by Herbert as occurring in epidemic form in Bombay, but apparently this epidemic is closely allied to it. It differs from the descriptions I have seen in the character of the maculae, and in its intractability as well as in the absence of bacteria.

Since writing the above a patient, who was in the same wards as sufferers from the complaint, has developed the disease in a previously healthy eye. This is the first occasion on which any evidence of contagion has been apparent.

NOTES ON A RARE FORM OF SUBCONJUNCTIVAL GRANULOMA MET WITH IN CENTRAL CHINA

BY

P. L. McALL, B.A., M.B., Ch.B.,

LONDON MISSION, HANKOW.

THERE are seen from time to time in Central China patients whose eyesight is obstructed, entirely or partly, by the formation of tumour-like masses which grow between the eyeball and the lid. There is no conjunctivitis or other acute inflammation. The growths are painless; they do not ulcerate on the surface or break down in the centre, but remain firm throughout. They gradually involve the eyelids, producing great thickening, which finally causes the mechanical occlusion of the palpebral aperture.

The writer has seen about a dozen cases of this condition. The patients varied in age from 15 to 40 years, the majority being men. One or both eyes may be involved, the duration of the case ranging between one and a half and nine years.

The usual progress of a case is as follows: The growth commences as a rule near the inner canthus (rarely under the outer half of the upper lid), as a firm, fleshy thickening and protrusion of the conjunctiva. The protrusion is reddish in colour and not oedematous, and forms flat or rounded and nodular masses, one-eighth to one-half inch in extent, which interfere with the accurate closure of the lids. The conjunctiva does not move on the surface of the growth, but is closely adherent to it. The growth then spreads around the inner surface of the lids, involving the upper and lower fornices and making a heavy nodular curtain

between the eyeball and the lids (Fig. 1). With a probe one can make out a sulcus between the upper lid and the growth, and another sulcus between the growth and the eyeball (Fig. 2). In the case of the lower lid these sulci are less marked. The movements of the eyeball are still free, so that the cornea and the pupil can be

FIG. 1.

Moderately severe case showing flat or nodular masses between eye and lids.

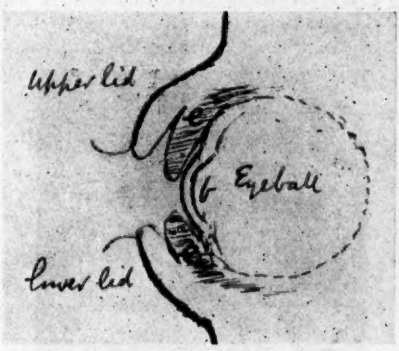


FIG. 2.

Diagrammatic section through eyeball and lids showing the curtain-like growths.

f—The cornea.

e, e—The tumour masses.

seen moving behind and between the masses of the growth (Fig. 3). Later, the growth involves the ocular conjunctiva, causing some limitation of movement of the eyeball. It does not, however,

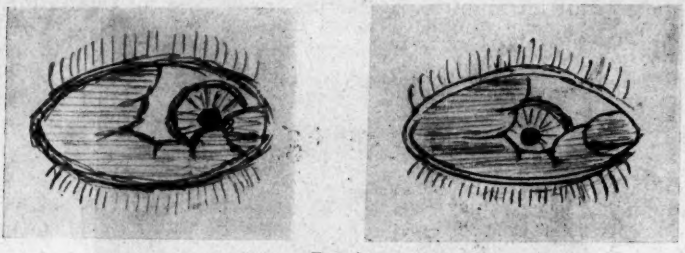


FIG. 3.

Same case as Fig. 1. Drawings show how the eyeball could move behind the growths.

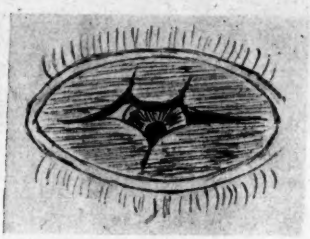


FIG. 4.

Drawing of a more advanced case, showing how the tumour masses gradually spread in front of the eyeball.

FIG. 5.

An advanced case involving all the eyelids; duration, left eye 6 years, right eye 7 years. Dark central area in palpebral aperture leads down to cornea.

invade the cornea or become adherent to it (Fig. 4). Still later, the palpebral conjunctiva is involved. The lid becomes greatly thickened, so that, viewed from the side, the palpebral mass bulges

FIG. 6.

Same case as Fig. 5. Sketch of right eye. Eyelashes show where margin of lids formerly was and degree of eversion of conjunctiva.

FIG. 7.

Diagrammatic section through eyeball in a case like Fig 5.
a, b—Upper and lower lids.
c, d—Everted conjunctiva.
f—Cornea.
e, e—Tumour masses.

forward very markedly. The progress of the case suggests that the tissue beneath the conjunctival fornix hypertrophies and slowly pushes the conjunctiva before it, in the form of a fold between the

globe and the lids, and later obliterates the fornix, causing the conjunctiva to stretch from the edge of the cornea direct on to the inner surface of the margin of the lid (Figs. 5 and 6). The palpebral conjunctiva may become everted to the extent of one-third of an inch near the margin of the lids and show a dry atrophic or eczematous condition. The growth of the tumour mass at the inner and outer canthi, combined with that along each lid, causes the palpebral aperture to be almost concentrically reduced, till, in an

FIG. 8.

Rare type, involving only one eyelid.

extreme case, it is represented by a tunnel about one-eighth of an inch across, leading down to the clear cornea (Fig. 7). This gets easily blocked by secretions or eczematous scales, and vision is lost. Movements of the eyeball are progressively interfered with, so that eventually a strong effort to move the globe results in a slight twitching of the palpebral mass, to which the globe has now become anchored. The skin is not infiltrated by the growth but moves over it. The secretion of tears does not seem to be affected. In some cases only one lid is involved (Fig. 8).

Patients show no sign of syphilis, tubercle, leprosy, or other infection. The Wassermann reaction was not available, but large doses of pot. iod. had no effect. There is no enlargement of the lymphatic glands, and general health is unimpaired.

Some cases were operated on, and it was found that the growth is not encapsuled, but gradually merges into the surrounding tissue. It is intimately blended with the conjunctiva, so that the latter cannot be stripped or dissected off it. The growth often extends backwards by the side of the eyeball into the orbit. In late cases it involves the tissue of the lids. The texture of the tumour tissue is for the most part firm but friable. In the palpebral region it is harder, almost cartilaginous. In no case could one feel reasonably sure of having removed all the diseased tissue. After operation the lids cicatrize, become indurated, and adhere to the globe. Recurrence occurs later, the lid becomes thicker and further infiltrated by the growth. Finally, if the cornea is no longer protected by the lid, it of course becomes dull and lustreless.

Under the microscope, sections of the tumour show that the bulk of the growth is composed of round cells (lymphocytes) which are infiltrating the normal tissues. They involve the deep surface of the conjunctiva; the cells in the centre of the tumour show no sign of breaking down. The periphery of the tumour is rather vascular, while the vessels in the centre of the growth have thickened walls. Up to the present no organisms or parasites have been discovered in the tissue, but one suspects that such may be found ultimately as the cause of these growths, which seem to be a form of local granuloma.

The writer wishes to thank Dr. H. Byles, Dr. J. Cormack, Dr. T. Gillison and Dr. A. Skinner (who kindly allowed him to see cases under their care), and would be glad to hear from others who have seen similar patients.

ANNOTATIONS

General Medical Council

It will be remembered that the General Medical Council rejected the recommendations of the Council of the British Ophthalmologists with regard to the undergraduate curriculum and examinations. Our contemporary, the *Medical Press and Circular* (Dec. 10, 1919), points out that the Council appears now to have "been roused to recognize some part of their duty in the matter. It is true in their belief that the present regulation in force as to the demand for a certificate in ophthalmology for the qualifying examination sufficiently meets the exigencies of the case; but in this connection the most important fact remains ignored—namely that the examination in eye diseases of a student by a general surgeon cannot be regarded as an examination in ophthalmology. Nevertheless, it is satisfactory to

note that the Council have recognized the necessity of obtaining from all the licensing corporations a return showing the regulations in force as to the teaching of ophthalmology, and this mandate is in process of being complied with. That is something to the good, but it does not go far enough. The suggestion may be made that if the Council were to approve of a regulation requiring every examining Board to include in its constitution one ophthalmic surgeon, it is certain that the speeding up of ophthalmological teaching in this country would immediately follow. A student's study of a subject is largely dependent upon his examinational interest in it. He is naturally disposed to shirk anything upon which an examinational knowledge is not directly insisted. Ophthalmology is one of these subjects; a perfunctory compliance with the General Medical Council's regulation, by which a certificate for attendance is granted, may only endow him with a distinguishable negligent knowledge of diseases of the eye, and yet, despite this, he is able to obtain his qualification to practise. Having regard to the importance of ophthalmology as a special branch of medicine, the ophthalmologists are making a just claim for its examinational recognition."

British Ophthalmology

It is impossible to over estimate, at the present moment, the importance of re-organizing on a broad basis the Schools of Ophthalmology in the British Isles. Never has there been such an opportunity as that now offered, both in scope and promise of improving our speciality, if all British ophthalmic surgeons — realizing the necessity for reconstruction—will throw themselves whole-heartedly into working out a thorough scheme with zeal and energy.

We should ensure, first, that the new generation of surgeons shall be fully trained, and, secondly, that treatment both preventive and curative for hospital and private patients shall be more fully organized.

The admirable report of the Council of British Ophthalmologists, published in the last number of this Journal, should give great impetus to the teaching of ophthalmology all over the British Isles. The need of some recognized diploma or degree in ophthalmology, which must be obtained by a surgeon before he is admitted as a candidate for any important ophthalmic post, has long been felt.

In the past most of the leading medical schools and special hospitals have required merely that candidates for ophthalmic posts shall be Fellows of the Royal College of Surgeons of England, and have insisted upon no guarantee that such candidates have been

through any complete course of ophthalmology. This is quite inadequate.

If systematic courses of ophthalmogy were developed, the examining bodies, which up to the present have failed to support the interests of this branch of surgery, might then be stimulated to institute special examinations for degrees and diplomas carrying the weight of the higher surgical qualifications. In the scheme of reconstruction candidates who have never been through a complete curriculum should not be eligible to hold important teaching posts. At the present time a teacher may, for instance, not have taken any pathological course, and may, therefore, be quite incapable of correlating the pathological with the clinical aspects of disease, which is the only true basis of sound practice.

Another point of great importance is that the public has no means of judging the qualifications of those practising ophthalmic surgery. Surgeons with meagre ophthalmic knowledge may settle in fashionable quarters and obtain an influential clientèle, with the inevitable result that serious mistakes are made and discredit is thrown upon British ophthalmology. If a Diploma were insisted upon the absence of such qualifications would be a warning to the public.

Considerable energy is already being shown in the development of special courses, a movement which needs strengthening and co-ordinating. If an enthusiastic effort is made now, there is no reason why the British School of Ophthalmology should not take the same high place of popularity that it held in earlier days.

For years to come the ophthalmic schools of Austria and Germany will not be frequented by the students of the Allied nations who, in the past, have been attracted to them by the greater organization of the classes of instruction. There is no reason why these should not study in the British schools and find the benefit of the more practical methods adopted in this country, provided that complete organization of instruction is combined with thorough and practical clinical work.

Ophthalmology has always been recognized as one of the most important specialties, and the whole profession would welcome an energetic movement of this kind.

Yet not only must the training of ophthalmic surgeons be improved but also the treatment of patients. The British public should be led to recognize that a British opinion is as valuable, if not more valuable, than one obtained elsewhere.

One of the chief difficulties is the absence of high-class institutional treatment for the well-to-do patients. The nursing home system in this country is faulty, and spas and health resorts need to be reorganized and developed to make them both more efficient and attractive. This principle is no less important in our hospital practice.

One of the lessons of the war is the wonderful saving in time and man-power that was effected by institutional treatment from the beginning of such cases as corneal ulcer, iritis, etc. This lesson should be applied to civilian practice and to civil hospital patients. At present the triumphs of in-patient treatment are obtained with cataract and glaucoma patients who have often come to the end of their active life. There is a tendency to fill the beds with operation cases, so that no room is available for many cases requiring treatment. Institutional treatment at an early stage might save many a clear pupillary area of the cornea, and might leave an eye affected with iritis ready to resist any subsequent recurrence, unhampered even by a single adhesion. By sending these cases to be treated in a haphazard way in their own homes both time and power are lost.

Should not all leading ophthalmic hospitals now have convalescent homes, such as the army hospitals have had abroad, where complete recovery can take place in fresh air, and under skilled attention, combined with adequate occupation and amusement? If these homes were established to receive the convalescents the present hospitals would still be able to restore sight to the aged by operation, while all the cases in the acute stages of disease could at once, without overcrowding, be admitted for institutional treatment and passed on to the convalescent home for complete recovery under more salubrious surroundings than can be afforded by city hospitals.

Such homes may be difficult to obtain at the moment owing to expense, but it would be well to have a complete and concrete policy to put forward should the voluntary hospitals, in the near future, be taken over wholly or in part by the State.

REPORT OF THE COUNCIL OF BRITISH OPHTHALMOLOGISTS

On the visual requirements of persons licensed to drive mechanically propelled vehicles on public roads

THE following report is the result of an enquiry conducted during the early months of the year, 1919, by a Committee appointed by the Council of British Ophthalmologists. The Council was impressed by the increasing number of accidents caused by motor traffic, and desired to ascertain to what extent these might be due to defective vision on the part of drivers. Unfortunately, as will be seen from the report, statistics on this point are meagre. As matters at present stand, the only qualification required for obtaining a licence to drive a motor vehicle, other than a public conveyance, is that the applicant must be 17 years of age, and it is

a fact that a blind man has obtained a licence. The problem before the Council has been to ascertain the types of visual defect which may interfere with or delay a driver's power of taking any action necessary to prevent accidents, and, as far as possible, to determine a standard which will not exclude drivers whose visual defect is such as not to interfere with their capacity for driving with safety.

The report is divided into five parts:

I.—The existing conditions under which licences are granted to drivers of various forms of mechanically propelled vehicles in this and other countries.

II.—The number of accidents occasioned annually by mechanically propelled vehicles in London.

III.—The various kinds of visual defects in motor-drivers from which accidents may arise:—

(1) Blindness in, or loss of one eye.
(2) Conditions necessitating the habitual use of spectacles.
(3) Defective acuity of vision both with and without spectacles.
(4) Restricted fields of vision; night-blindness.
(5) The presence of diplopia or squint.

IV.—Proposed scheme of vision testing for licences.

V.—Summary of recommendations.

1.—The existing conditions under which licences are granted to drivers of various forms of mechanically propelled vehicles in this and other countries

The United Kingdom.—There are at present two forms of Licence granted in this country in connection with motor driving, a County Council or Borough Council Licence and a Public Carriage Police Licence.

1.—*County Council or Borough Council Licence*

This is granted by County Councils or Borough Councils to any applicant over 17 years of age on payment of a fee of 5s. It is granted merely for the purpose of registration; it calls for no investigation of the applicant's vision or fitness to drive; and it is liable to endorsement or suspension in a Magistrate's Court for offences under the Motor Car Act.

2.—*Public Carriage Police Licence*

This is granted by the Police to drivers of public motor vehicles, hackney motor cabs, motor omnibuses, and tramway cars.

In January, 1916, a Committee was appointed by the Home Secretary to consider and report on the licensing of partially disabled

men as drivers of public motor vehicles, and the following is taken from the recommendations with regard to "Loss of Eye":—

"The views which we have heard in evidence are perhaps a little "less divergent in this instance. The witnesses have been "practically unanimous in the opinion that the *right eye is more* "*important than the left eye in the case of motor car driving.* The "main reason is that the driver who had lost his right eye would be "compelled to turn his head completely round should he wish to "see if any traffic were trying to overtake him, and he would also "be in great danger of causing an accident by turning his vehicle "to the off side across incoming traffic. The sideward vision of the "right eye is clearly of great importance. There is hardly a "dissentient voice as regards the *absolute necessity for a sound right* "*eye.* With *tramcars,* on the other hand, the *possession of the left* "*eye is perhaps more important.* As a rule tramlines are laid at the "middle of the road and the space for other traffic is on the near "or left side. Passengers approaching the vehicle are also coming "from that side. For these reasons a man could hardly be an "efficient or safe driver without his left eye; the right eye is, "however, also of considerable importance, and the medical adviser "of the London County Council stated that he would not accept "any man for service who had lost one eye."

"Assuming for a moment that men with only one eye were "licensed, the main dangers would be:

"(1) the limitation of the field of vision already mentioned;

"(2) the danger of being temporarily blinded through getting grit "or flies into the single sound eye.

"The driver would be compelled to stop at once and he might "possibly cause an accident in his blinded condition in bringing "the vehicle to a standstill.

"One of the witnesses suggested that the loss of an eye is a less "important handicap than the use of glasses, but we cannot accept "the view that the one-eyed man is safer than the man with "glasses.

"The medical adviser of the London General Omnibus Company "laid great stress upon the importance of eyesight. He regards "equal and normal sight as essential in an omnibus driver, and "states that he would never admit a one-eyed man for service, "pointing out that in passing a vehicle in a crowded thoroughfare, "the question of inches tells, and it is impossible for a man's "eyesight to be too good. We have given very close consideration "to this question of eyesight. We know that certain men can rise "superior to almost any physical disability, but we do not feel that "men who have suffered in this particular respect ought to be "encouraged to adopt a calling like motor driving, which requires "rather more than the average capacity. We are informed that the

"licensing of a man with only one eye would not be altogether "without precedent, as the Commissioner of Police, some years ago, "in sympathy with men already licensed who met with accidents "and lost an eye, decided to continue their licences. In these "circumstances, however, the men—being old hands—would "naturally be better equipped for driving a public vehicle than an "applicant without previous experience, and we are doubtful "whether such a decision would have been arrived at under present "traffic conditions, and if the concession had not been limited to "certain special classes. We are of opinion that every man licensed "should have two eyes, and that one of them, at least, should be a "good and normal one. If the other eye were to some extent "defective, but the vision were fair, and the field of vision good, we "do not feel that this defect need be a bar, but we would not "recommend any concession beyond that.

"Being entirely convinced, our considered opinion is that—having "regard to the normal conditions of traffic in the Metropolis—licences "to drive motor cabs, motor omnibuses or tramway cars should not "be granted to men who have suffered the loss of an arm, hand, leg, "foot or eye. In the case of injury to one eye, provided the other "eye is sound and the injured eye retains fair vision, we think a "licence might be granted, each case being of course decided on "its merits."

The recommendations and report of the Maimed Drivers' Committee were approved by the Secretary of State, and consequently the Commissioner of Police in London feels bound by them in his capacity as Licensing Authority at the present time. The terms "normal eye" and "fair vision" are not defined in the report, but the Licensing Authorities have adopted as their interpretation of the term "normal eye" an eye with visual acuity equal to 6/6 and a full field of vision, and of the term "fair vision" visual acuity equal to 6/24 and a full field of vision. In actual practice, all that is required is that the applicant for a police licence shall produce a certificate from any medical man stating that his sight is sufficient to enable him to drive with safety the vehicle for which he desires a licence. It is not necessary for the medical man to state what the applicant's visual acuity is, but should he do so, and should it be below the above standard, either the licence is refused, or the applicant is sent by the police to an ophthalmic surgeon for examination and report.

In some of the large provincial towns in England, such as Liverpool, Manchester, and Birmingham, we have ascertained that in no case is there any special test of vision, but that a taxicab driver, before a licence is granted, is sent out with an official deputed by the police to test his driving capacity.

*France.**—It is necessary for every driver of a motor-propelled vehicle to hold a licence ("*Permis de conduire*"). This can be obtained only after an examiner has satisfied himself that the driver is capable. An international pass can be obtained in London by a British subject wishing to take his car into France, but a similar examination has to be passed. In neither case is there any actual eyesight test.

In Paris there do not appear to be any special regulations concerning the granting of licences to drivers of taxi-autos. Persons applying for such licences must have the usual French "*Permis de conduire*," or driving licence, and when making their application must submit their birth certificates and identity papers. They have also to pass an examination as to their knowledge of the streets of Paris.

United States of America.†—Very few of the States comprising the United States of America make any reference to vision in their regulations for granting licences to drive motor vehicles. Such of them as do allude to the question do not state that any standard of vision is required or that any definite tests have been established: vague statements are made to the effect that eyesight of applicants must not be impaired or defective.

Various cities have, however, considered the question of vision in granting licences to taxi-cab drivers. In Chicago, for example, an applicant before being granted such a licence is required to have a certain standard of distant vision as tested by test types.

2.—The number of accidents occasioned annually by mechanically propelled vehicles in London

The following tables show the number of accidents known to the police to have occurred in the streets within the Metropolitan Police District during the years 1912 to 1917 (inclusive).

Class of Vehicle.	Fatal.					
	1912	1913	1914	1915	1916	1917
Motor Omnibus	167	180	148	154	194	128
Tramcars	37	58	37	86	86	64
Motor Cabs	40	29	58	64	52	35
Private Motor Cars	75	83	118	188	142	116
Motor Cycles	7	13	22	28	12	10
Trade and Commercial Cars ...	43	60	107	145	165	180
Traction Engines, etc. ...	—	1	3	1	3	2
	362	424	493	666	654	535

* We are indebted for this information to the Secretary of the Royal Automobile Club.

†We are indebted for this information to Dr. W. Campbell Posey, of Philadelphia, Dr. Frank Allport, of Chicago, and Dr. Gordon L. Berry, Field-Secretary of National Committee for the Prevention of Blindness, New York.

Class of Vehicle.	Non-Fatal.					
	1912	1913	1914	1915	1916	1917
Motor Omnibus	2,580	3,255	3,007	2,572	2,395	1,743
Tramcars	2,303	3,037	3,171	4,001	3,913	3,136
Motor Cabs	2,091	1,948	3,085	2,251	1,609	1,172
Private Motor Cars	2,821	2,977	3,682	3,920	3,242	2,452
Motor Cycles	768	1,133	1,465	1,696	1,154	840
Trade and Commercial Cars...	395	819	1,218	1,918	2,189	2,202
Traction Engines, etc. ...	8	14	10	8	10	6
	10,966	13,183	14,683	16,366	14,592	11,551

Though it will be observed that the annual number of fatal and non-fatal accidents had decreased during the years 1916 and 1917, it must be remembered that the number of hackney carriages plying for hire was considerably diminished during this period. In December, 1914, there were licensed:

Taxicabs, 7,260. Drivers, 9,082

In December, 1918:

Taxicabs, 3,821. Drivers, 5,476

One striking feature shown in these tables is the steady increase in the number of accidents, both fatal and non-fatal, caused by trade and commercial cars during the whole period dealt with, even during the last two years when the total number of accidents decreased. Less care has probably been taken in the selection of drivers for this class of vehicle than for any other.

These accidents are attributable to various causes. Having regard to the conditions under which licences to drive mechanically propelled vehicles are granted, there can be little doubt that defective eyesight of drivers is one cause.

3.—The various kinds of visual defects in motor-drivers from which accidents may arise

(1) *Blindness in, or loss of one eye.*—Persons who are blind in, or who have lost one eye, have a limitation of their field of vision, and can no longer see objects stereoscopically.

To compensate for the disadvantages occasioned by their limitation of field, those who have lost the sight of one eye generally learn to carry the head a little turned towards the blind side, so that the limitation becomes more equally apportioned on the two sides. They also in course of time instinctively acquire a habit of quickly moving the head towards the affected side, which enables them to mitigate to a considerable extent their disability.

Though, in motor-driving, stereoscopic vision is of some assistance in the judgment of distances, it is not the most important factor

concerned, several others, such as parallax and aerial perspective, being of greater importance. Individuals who have never had the use of the two eyes are often good judges of distance.

The evidence which the Council had collected from drivers of mechanically-propelled vehicles who become blind in, or lost one eye, is in accordance with the above observations. They all considered themselves fully competent to drive, well able to take care of themselves when so employed, and capable of avoiding risks which would be likely to endanger the safety of others. Those who after cross-examination admitted having met with accidents, denied emphatically that such accidents resulted from their visual defect. Those who had lost the sight of the right eye, when questioned as to the difficulty of seeing on-coming traffic on the off-side, or traffic approaching from a cross-road on that side, did not admit having experienced any inconvenience. All had had a blind side for some considerable time and doubtless had acquired compensatory movements of the head. There is no doubt, however, that a person who had only recently lost the sight of an eye, particularly the right, would for a time experience considerable difficulty in such circumstances.

All the drivers dependent on the sight of one eye only who were interviewed, admitted that they might find themselves disabled in the event of a foreign body getting into that eye, a disability which could only be guarded against by the habitual use of goggles, though the risk of it might to some extent be lessened by the use of a wind screen.

2. *Conditions necessitating the habitual use of spectacles.*—The habitual use of spectacles by a driver of a mechanically propelled vehicle might prove a hindrance to him in one of the three following ways:—

(*a*) By restriction of the field of vision.

(*b*) By reduction of the acuity of vision in dim lights.

(*c*) By the glasses becoming obscured either from the condensation of moisture (outside from mist, or inside from the eye), or from being bespattered with rain or dust.

(*a*) The amount of the restriction of the field of vision occasioned by ordinary spectacles would be very slight, much less than that produced by the use of goggles. Such evidence as the Committee has collected from motor drivers does not seem to show that the restriction of field caused by the use of ordinary spectacles has proved a source of danger.

(*b*) In transmission through glass loss of light occurs from absorption and also by reflection from the surfaces. In certain conditions of adaptation of the eyes to dim illumination, physical causes of this nature may more than counteract the beneficial effects of the correction of errors of refraction by spectacles.

(c) In motor driving obscuration of glasses by moisture from eyes only occurs in the absence of freely circulating air between the eyes and the glasses. It is not likely to occur, therefore, with the use of ordinary spectacles, or of properly constructed goggles where ventilation holes are provided in the surrounding material.

Obscuration of spectacles from without by mist, rain, or dust, can to some extent be guarded against by adaptable screens, extending from an over-hanging canopy above and from the footboard below, but not meeting. Such screens are provided in taxicabs and in most large motor cars. The drivers of motor omnibuses and tramcars have even less protection.

3. *Defective acuity of vision both with or without spectacles.*— It is difficult to determine from the evidence at present available what degree of acuity of vision an individual needs if he is to drive a mechanically-propelled vehicle with safety.

Further valuable information as to the influence which defective vision has in the causation of motor accidents might be obtained if the Authorities were to institute an investigation into the visual capacity of drivers in a series of cases in which accidents have occurred.

In the Report of the Committee on the granting to partially disabled men of licences to drive public vehicles already quoted, it was laid down: "That every man licensed should have two eyes and "that one of them, at least, should be a good and normal one. If "the other eye were to some extent defective, but the vision were "fair, and the field of vision good, we do not feel that this defect "need be a bar, but we would not recommend any concession "beyond that."

The interpretation which the licensing authorities for hackney carriages in London put upon the terms "normal eye" and "fair vision" in the above Report, is as follows:

A "normal eye" is an eye with visual acuity=6/6 as tested with Snellen's test types well illuminated, and with a full field of vision as tested by hand movement.

The term, "fair vision," is visual acuity=6/24 as tested with Snellen's test types well illuminated and a full field of vision as tested by hand movement.

The evidence on which the "Maimed Drivers' Committee" based this part of its report was the expression of opinions by the witnesses examined and was not founded on definite instances of accidents occasioned by defective vision.

The standard of central acuity of vision required for chauffeurs by the Army is, without glasses, in one eye 6/18 and in the other 6/60, no distinction being made as to which eye should have the better vision (A.C.I. 664, 1918). Many motor drivers employed by the

Army during the war had to drive heavy motor lorries along bad roads at night.

The Council have had a return of all the motor accidents occurring in the 1st and 2nd Transport Companies at Grove Park during the months of January and February, 1919, 36 in all. The vision of the drivers in these accidents was obtainable in 14 cases, and it was found that central acuity of vision in the better eye in more than half the cases equalled 6/6, and in none of the cases was it less than 6/12. This evidence, for permission to use which the Council are indebted to General Sir J. H. Goodwin, K.C.B., D.G.A.M.S., shows that the accidents which occurred, in the cases investigated, could not be attributed to defect of vision.

The Council do not think, however, that the standard of central acuity of vision for motor drivers in the Army under war conditions, when there was a shortage of labour, can be taken as a suitable standard for motor drivers of public vehicles in civil life, in time of peace, when there is an ample supply.

(4) *Restricted fields of vision and night blindness.*—For the quick perception of on-coming traffic, or of objects approaching from either side, a full field of vision is the most important factor, rather than acute form sense in the centre of the field such as is tested by reading letters of different sizes in Snellen's test types.

It is from the stimulation of the peripheral portions of the retina that the approach of on-coming objects from behind, or from side turnings, is first perceived. It is, therefore, often the part of the retina which affords the earliest intimation of the approach of dangers which might culminate in collisions.

The presence of lowered acuity of vision in dim light, or of slow adaptation of the eyes from one light to another (" night blindness ") might prove very dangerous to drivers of mechanically-propelled vehicles which do not carry powerful head lights. They are conditions, therefore, likely to cause accidents in towns where the use of powerful head lights for motor vehicles is not permitted. The presence of a slight degree of night blindness is often difficult to detect without a very searching examination. For the purposes of motor driving the most practical test of a person's light-sense would be a trial trip at night, during which he should be required to show his capacity for steering a motor car in dim lights, and under varying conditions of illumination. This latter test would afford some criterion as to the time required for the eyes to adapt themselves from light of one degree of intensity to that of another.

(5) *The presence of diplopia or squint.*—A disordered movement of the eyes which causes a driver to see double must obviously be a serious source of danger in the steering of a mechanically propelled vehicle.

Disordered movements of the eyes may exist without double

vision, the individual so affected using only one eye, suppressing the image formed by the other. Such individuals do not possess stereoscopic vision and are thus handicapped to some extent in their judgment of distances.

Disordered movements of the eyes causing one eye to turn inwards, "convergent squint," produce, besides the loss of stereoscopic vision, some limitation of the field of vision, on the side of the squinting eye.

4.—Proposed scheme of vision-testing for licences

Although it is desirable that some test should be made of the visual capacity for motor driving of every applicant for a licence (or renewal of licence), it is impracticable to subject every such applicant to a satisfactory sight test.

The standards of vision necessary for driving mechanically propelled vehicles are not the same for all classes of drivers. The visual requirements of one who drives his own car and of a driver of a hackney vehicle are different. A driver of his own car can choose his own route, his own time, and the pace at which he goes. A driver of a hackney vehicle is not a free agent in these matters; he must go by such route, at such time, and at such pace as his employer directs. The responsibilities of motor omnibus and tramcar drivers are greater than those of drivers of other forms of motor conveyance. The former carry in their vehicles a large number of passengers, and proceed along fixed routes at stated times. The vehicles which they steer are larger and heavier, and as a rule the drivers are less adequately protected from the effects of mist, rain, and dust. Tramcars proceed along fixed lines, and do not require to be steered from side to side amongst surrounding traffic, like motor omnibuses. In 1917 motor omnibuses and tramcars were responsible for 36 per cent. of the fatal, and 42 per cent. of the non-fatal motor accidents reported in London (see tables, pages 32 and 33.)

The visual requirements of hired drivers, other than the drivers of hackney vehicles, such as private chauffeurs and the drivers of trade and commercial cars have also to be considered.

The Council is of opinion that every applicant for a licence to drive a motor car or motor cycle, such as is now granted by a County or Borough Council, should be required to show his ability to steer such a vehicle round corners and to avoid obstacles. This would afford a rough test of his visual powers, though it would not exclude a person who has lost the sight of one eye or has low acuity of vision, or night blindness. *No person who from any cause has double vision should be granted a licence.*

If a regulation to this effect is instituted, and licences are granted only to those persons who show themselves competent to drive, it will be necessary to grant temporary permits to those learning to

drive. It should be made obligatory for anyone using such a permit to be accompanied by a licensed driver, except in the case of a motor cyclist.

The Council is also of opinion that certificates should be granted to applicants stating their visual fitness to drive certain classes of motor vehicles, after having had their sight tested by ophthalmic surgeons appointed for that purpose. These certificates should be divided into three grades, A, B, and C.

Grade A would certify the holder's visual capacity to drive any kind of motor vehicle.

Grade B would certify the holder's visual capacity to drive any kind of motor vehicle other than motor omnibuses or tramcars.

Grade C would certify the holder's visual capacity to drive motor tramcars.

For Grade A certificate an applicant, in addition to manifesting his ability to steer a motor car satisfactorily in daylight, should be required, in a trial trip at night, to show himself capable of driving in dim light and under varying degrees of illumination.

In the absence of further data than the Council possesses at present it suggests that the vision required for a Grade A certificate should be fixed at a high standard and considers that visual acuity of a standard equal to 6/9 in one eye and 6/24 in the other, without the aid of glasses, should be adopted. It is not necessary to specify which eye should have the better vision. Every applicant should have in each eye a full field of vision as tested by hand movement, or in case of doubt by a perimeter, and should have no manifest squint, nor double vision.

Grade B certificate differs from Grade A certificate in allowing the applicant to use glasses to reach the required visual standard. The presence of a squint should not disqualify.

For Grade C certificate the same visual standards should be required as for Grade A certificate, but the driving tests must be made on a tramcar instead of on a motor car.

If these certificates of sight for motor drivers be instituted the Council thinks it should be compulsory for every driver of a mechanically propelled hackney vehicle to obtain the appropriate certificate before being granted a licence to drive.

The Council would here point out that in setting up standards of vision for hackney cab drivers it must be recognized that some persons have a greater capacity than others for overcoming the disadvantages occasioned by a visual defect. This is due to several factors of which the most important are: the varying degrees of rapidity with which individuals respond to a visual stimulus, and the influence of previous training. It is as some rough practical test of the former that the Council recommends a daylight trial trip as well as the direct vision test, and in connection with the latter it recommends

that some leniency might be shown as to the standard of central acuity of vision required for the renewal of licences to hackney cab drivers of long experience. The Council considers that licences in such cases might be renewed when the standard of central vision is equal to 6/12 in one eye and 6/36 in the other, with or without glasses.

In view of the large number of accidents occurring in connection with motor vehicles driven by hired drivers, other than licensed hackney carriage drivers, and especially in connection with trade and commercial cars, which in 1917 were responsible for 33 per cent. of the fatal and 19 per cent. of the non-fatal motor accidents in London (vide pages 32 and 33), the Council urges that all employers should be strongly advised to engage only such drivers as have obtained a Grade A or a Grade B certificate.

5.—Summary of Recommendations

In conclusion the Council's recommendations may be summarized as follows:

I. That before a licence is granted by a County or Borough Council to an applicant to drive a mechanically propelled vehicle along the public roads such applicant be required to show his ability to steer a motor car round corners and to avoid obstacles.

II. That before such a licence be renewed the applicant be required to sign a statement that since the licence was granted he has not suffered from any physical disability likely to interfere with his driving capacity.

III. That if a licensed driver who suffers from some visual defect meet with an accident attributable in any way to that defect, he shall be liable to have his licence taken from him, or endorsed, as may be considered desirable in accordance with the circumstances of the case.

IV. That special sight test certificates for drivers of motor vehicles be instituted, and granted to applicants whose sight has been tested by ophthalmic surgeons appointed for the purpose, these certificates to be of three grades:

Grade A, certifying the holder's visual capacity to drive any kind of motor vehicle.

Grade B, certifying the holder's visual capacity to drive any kind of motor vehicle other than a motor omnibus or tramcar.

Grade C, certifying the holder's visual capacity to drive a motor tramcar.

For Grade A certificate:

1. Every applicant, in addition to manifesting his ability to steer a motor car satisfactorily in daylight, should be required, in a trial trip at night, to show himself capable of driving in dim light and under varying degrees of illumination.

2. In an examination by an ophthalmic surgeon he should show:

(*a*) Visual acuity of 6/9 in one eye and 6/24 in the other eye without the aid of glasses.

(*b*) A full field of vision in each eye.

(*c*) No manifest squint.

(*d*) No double vision.

For Grade B certificate:

1. Every applicant, in addition to manifesting his ability to steer a motor car satisfactorily in daylight, should be required, in a trial trip at night, to show himself capable of driving in dim light and under varying degrees of illumination.

2. In an examination by an ophthalmic surgeon he should show:

(*a*) Visual acuity of 6/9 in one eye, and 6/24 in the other eye with glasses if necessary.

(*b*) A full field of vision in each eye.

(*c*) No double vision.

For Grade C certificate:

1. Every applicant should be required in a trial trip to show himself capable of driving a motor tramcar by day and by night under varying degrees of illumination.

2. In an examination by an ophthalmic surgeon he should reach the same visual standards as for a Grade A certificate.

V. That an applicant for a licence to drive a mechanically propelled hackney carriage be required to obtain the appropriate sight test certificate before such licence be granted.

An applicant for a renewal of licence to drive a hackney motor cab who is an experienced driver might, however, be granted such a renewal with a lower standard of central acuity of vision, viz., 6/12 in one eye and 6/36 in the other with or without glasses.

VI. That owners of mechanically propelled vehicles, other than hackney carriages, be strongly advised to employ as drivers only those who have obtained a Grade A or Grade B certificate.

VII. That temporary permits be granted to those learning to drive mechanically propelled vehicles. When driving motor cars along the public roads, the holders of such permits must be accompanied by a licensed driver.

REPORT ON THE DESIRABILITY OF A SPECIAL QUALIFICATION IN OPHTHALMOLOGY

Examinations in Ophthalmology in America

Since the publication of the above report in these columns (December, 1919) the Council of British Ophthalmologists has received the following additional information (*American Journal of Ophthalmology*, May, 1919), due to the courtesy of Dr. A. Casey Wood.

"THE American Board for Ophthalmic Examinations is composed of representatives of the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the Academy of Ophthalmology and Otolaryngology. By arrangement with the American College of Surgeons, the Board has become the Ophthalmic Credentials Committee of the College, and conducts the examinations of the ophthalmic candidates for Fellowship in the College.

For a certificate of this Board, the examination in ophthalmology consists of first, case records; second, written examinations; and third, clinical laboratory and oral examinations, or so much thereof as may be judged necessary:

(*a*) Candidates in ophthalmology are required to submit twenty-five complete case records of which not more than ten should be descriptive of operations. These records should be of cases of ocular diseases and defects of varied character, including errors of refraction or muscle balance; external ocular diseases or diseases of the uveal tract or retina, or of the optic nerve, or glaucoma. The reports should show especially the reasons for the diagnosis, and for the operative treatment and the technic of operations in operative cases.

(*b*) The written examination will test the candidate's knowledge of the underlying principles of the science of ophthalmology, including anatomy, embryology, physiology, physiologic optics, pathology, relations of the eye to the other organs and diseases of the body.

(*c*) The oral examination will include: The external examination of the eye. Ophthalmoscopy (candidates are requested to bring their own ophthalmoscopes). Measurement of errors of refraction. Testing of the ocular movements and fields of vision. Relations of ocular conditions to diseases of other parts of the body and their treatment. Laboratory examination in histology, pathology, and bacteriology of the eye.

Further information may be had upon request from the Secretary, Dr. William H. Wilder, 122, South Michigan Avenue, Chicago, Illinois."

ABSTRACTS

GLAUCOMA AND GLAUCOMA OPERATIONS.

(1) **McGuire, Hunter (Winchester, Va.). — Hydrophthalmos following trauma.** *Ophthal. Record*, March, 1915.

(1) **McGuire** describes a case of hydrophthalmos in a boy, aged four years, which followed a perforating wound of the cornea and lens capsule by a piece of wire. The lens matter gradually absorbed, but, at the end of six months, before the pupillary area had become quite clear, the eye showed signs of developing hydrophthalmos, with atrophy of the iris which became tremulous, but no opacity of cornea and no congestion or pain in the eye. Two and a half years after the accident the tonometric reading was 43 to 54. Vision: doubtful P.L. An iridectomy gave temporary relief of tension, which, however, soon rose again and trephining was tried with similar results. The eye became painful, ectatic, and very much enlarged, and a year later it was excised.

J. JAMESON EVANS.

(2) **Böhm (Breslau).—Contribution to the pathological anatomy and operative therapy of congenital hydrophthalmos. (Beiträge zur pathologischen Anatomie und operativen Therapie des angeborenen Hydrophthalmus.)** *Klin. Monatsbl. f. Augenheilk.*, 1915, Nov.-Dec., p. 556.

(2) **Böhm** gives a minute description of four eyes in which iridectomy had been performed for congenital hydropthalmos. In all four no proper Schlemm's canal could be discovered, ruptures of Descemet's membrane were present, the lens was cataractous, and the retina and choroid were more or less atrophic, and the optic disc was cupped. Iridectomy had failed in all four cases, although in two no stump had been left and the angle of the anterior chamber had been freed. In the other two short stumps had remained, in one case blocking the previously free angle, in the other adherent to the cornea by lateral anterior synechiae. On the question of iridectomy versus sclerostomy the author has no definite opinion to offer, but appears to incline towards the former.

H. M. TRAQUAIR.

(3) **Morax, V. (Paris). — Simple glaucoma or atrophy with excavation. (Glaucome simple ou atrophie avec excavation.)** *Ann. d'Oculist.*, January, 1916.

(3) **Morax** has made a careful study of five cases of optic atrophy with excavation of the optic nerve, but with normal or slightly subnormal tension, with a view to discovering whether such

cases are essentially optic atrophies or simple glaucomas in eyes where normal tension is unusually low. As a result of his investigation he concludes that, both from their clinical course and their therapeutic indications, these cases should be differentiated from those of simple glaucoma with slight hypertension, as they run a slow progressive course which is not influenced by pilocarpin or tension-reducing operations such as sclerecto-iridectomy.

R. J. COULTER.

(4) **Gifford, H. A. (Omaha).—Trephining in buphthalmos a disappointment.** *Ophth. Record*, August, 1916.

(4) **Gifford**, encouraged by "the admirable results of Elliot's trephining in chronic glaucoma, began at once to look eagerly for a case of buphthalmos to try it on." He was disappointed to get a poor result in each of two cases of buphthalmos on which he tried it. In both the operation was easy, but the reaction was somewhat prolonged, and the final result was *nil*. He has had similar reports from other surgeons. Gifford rejects the view that the failure of trephining in this condition is to be ascribed to a tendency to plastic exudation, and thinks it "more probable that on account of the excessive enlargement of the eye, the conjunctiva, especially at the limbus, must be applied abnormally tightly to the globe; hence, when after trephining, healing is complete, there must be unusual resistance to the formation of a bleb, and an abnormal tendency for the conjunctiva to block the trephine hole." He, therefore, suggests that instead of putting the hole as far forward as the abnormally wide limbus will allow, one ought to put it as far back as possible, and still keep the inner side of the hole within the chamber. This suggestion is in accordance with the reviewer's experience, and carries out the first principle of a successful sclero-corneal trephining, which is to tap and subconjunctivally to drain the anterior chamber, whilst placing the opening so far forward as to avoid danger of uveal impaction. An opening placed too far back might involve such a danger, but it is certainly not necessary to split the cornea, as is done in cases of ordinary glaucoma.

R. H. ELLIOT.

(5) **Prince, A. E. (Springfield).—Glaucoma simplex and the "mule shoe" drain.** *Ophthal. Record*, October, 1916.

(5) **Prince** secures a more permanent drainage through the trephine hole by the insertion into it of his gold "mule shoe" drain. The conjunctival flap is made by making an incision parallel to the corneal margin and 6 mm. from it. The reflection of the flap, the corneal splitting and trephining (1.5 mm. trephine) with iridectomy are carried out in the ordinary way. The drain, which consists of a gold ring with a solid toe, is then placed so that the

toe rests vertically in the trephine opening, while the position of the ring conforms to the surface of the sclera. The conjunctiva is then replaced in position over the drain, and stitched in position by an overcast suture. The eye is kept closed and bandaged for three days to permit a clot to fill the trephine opening and hold the drain in position.

J. JAMESON EVANS.

(6) **Knapp, Arnold.—The medical side of glaucoma.** *Arch. of Ophth.*, Vol. XLV, No. 6, November, 1916.

(6) **Knapp**, of New York, draws attention to the disposition shown in recent years to look for the cause of glaucoma in one or another of the wide-spread conditions which affect the body as a whole. He first reviews *some* of the literature, which deals with the relationship between an increase in general systemic pressure and a rise in the tension of the eye, and appears to accept the view now generally adopted, that in this case it is very hard to trace cause and effect. His own statistics of 50 cases support such a position. He next deals with the ophthalmoscopic changes found in the retinal vessels of glaucomatous patients; he has been "particularly struck by the frequent and very marked changes found in the acute glaucomas after the attacks were passed; some of the arteries were nearly obliterated and sheathed with broad white lines, and the discs were pale." He then passes on to consider the possible *rôles* of nephritis, nasal empyema, and nervous disturbances, and seems to share the general opinion as to the unsatisfactory nature of the results of such study up to the present, but thinks that the available evidence suggests an involvment of the sympathetic nervous system in glaucoma. He would tentatively adopt a classification of cases of primary glaucoma into (1) the circulatory and (2) the nervous. In the former group he would include all those cases which are "characterised by congestive attacks, by retinal vascular changes and by the local changes in the eye, which favour an increased tension." In the latter he would place those "which show dys-glandular disturbances, no arterio-sclerosis, and which affect any type of eye. . . . The treatment in the first group is operative, and of the greatest importance is the attention to the general health; in the second group, operation is indicated in some; our efforts at general treatment must await further knowledge of dys-glandular affections."

R. H. ELLIOT.

(7) **Hughes, H. S. (St. Louis).—An attack of acute inflammatory glaucoma caused by holocaine.** *Amer. Jl. of Ophthal.*, May, 1917.

(7) **Hughes** relates against himself an exceptionally interesting case of a female, aged 34 years, in whom he had diagnosed glaucoma simplex. This patient was under observation for correction of

refraction quite frequently. Doubtless no mydriatic was ever used on these occasions. Twelve years after the first occasion upon which the patient was seen, Hughes wished to take a tonometric reading, and, for the purpose instilled two drops of freshly prepared 1 per cent. holocain hydrochloride into each eye, and, later on, an extra drop into the right eye. Hughes then went out of town. Two hours after the visit the patient began to have severe pain and in two hours more she was semi-delirious. As the writer quaintly says, "When the long distance message reached me, I felt very much like staying out of town indefinitely." He ordered 1 per cent. eserin every hour, with hot fomentations. When the patient was seen eight hours after the attack "she had a most beautiful acute inflammatory glaucoma, particularly of the right eye." The symptoms subsided under energetic treatment, and iridectomy, hitherto refused, was duly performed. After excluding as causes mental impression from the use of the tonometer and the coincidence of an impending attack in any case, Hughes finds himself obliged to conclude that three drops of 1 per cent. holocain precipitated an attack of acute inflammatory glaucoma.

ERNEST THOMSON.

(8) **Ewing, A. E. (St. Louis).—Post-ciliary scleral trephining for glaucoma; the conjunctival flap; an improvised trephine.** *Amer. Jl. of Ophthal.*, February, 1917.

(8) **Ewing** has already described (*Am. Jl. of Ophth.*, July, 1917), his operation of post-ciliary trephining in which the method of forming the conjunctival flap was to make it with the first incision through the conjunctival and episcleral tissues down to the sclera. The method has not been uniformly successful, and he has now tried buttonholing the episcleral tissue down to the sclera at the location for the opening into the sclera at the base of the conjunctival flap. There has been no complication in the healing, but greater conjunctival swelling about the wound than in the previous cases and the soreness on pressure was more persistent. The continued soreness may mean that the thinner protection to the choroid is not desirable, although there is no intra-ocular evidence that the choroid is at all involved. In order to obtain a 2·5 mm. trephine (which was unobtainable from the instrument dealers) an improvised one was made by putting a very sharp edge on a tube made for punching eyelets, and fitting it with a rubber handle made from a laboratory rubber stooper trimmed down to the conical shape of the Elliot trephine handle.

ERNEST THOMSON.

(9) **Parker, Walter R. (Detroit, Michigan).—The present status of the sclero-corneal trephine operation for the relief of glaucoma.** *Arch. of Ophthal.*, Vol. XLVI, No. 1, p. 1, 1917.

(9) **Parker** compares the results of 71 trephine operations with those of 47 iridectomies, and clearly lays down the conditions under which the comparison has been made. It is essential to understand these before proceeding any further. Leaving blind eyes aside, for they do not come into the comparison of the visual results obtained, "all eyes with useful vision, when the fields were not extremely contracted, were subjected to an iridectomy if the anterior chamber were of sufficient depth to permit of its easy performance. In all other cases, except the haemorrhagic type . . . a trephine operation was performed." In other words iridectomy was performed in all favourable cases, and trephining was reserved for the rest. Parker recognizes this clearly, for he says "when we remember that practically all these cases (i.e. the trephined ones) were unfit for iridectomy, a procedure that results, as the trephine operation did in this series, in a reduction of tension without disturbance of the integrity of the globe in 60.9 per cent. of the cases operated on, certainly commands our attention and careful consideration." The various interesting tables presented, together with the remarks thereon, deserve careful attention. The summary, which closes the article, recommends the selection of the procedure best suited for each individual case as being preferable to subjecting all eyes to the same operation. Parker has been surprised to find the results of iridectomy so good, and says "if 50 per cent. of the selected cases of simple glaucoma can be relieved by iridectomy, and 50 per cent. of the remaining cases by trephine operation, the results of 75 per cent. good would be better than most operators have been able to obtain." He suggests that "deep iridectomy should be the operation of choice, not only in the inflammatory cases, but also in selected cases of the simple type, reserving the trephine operation for those cases in which the iridectomy is contra-indicated, or having been performed has failed to relieve tension." The idea that naturally will occur to many surgeons is that it is exactly in these early simple cases that trephining is most easy, and most likely to yield good results. Moreover, to trephine, when an iridectomy has failed, entails either trephining right over the coloboma, a procedure which decidedly adds an element of risk, or seeking another and a less advantageous site for the operation. Parker's paper is so full of condensed interest that it is difficult to do justice to it in a review, and it should therefore be read carefully in the original.

R. H. ELLIOT.

NOTES

Deaths

THE death is announced of James Crawford Renton, of Glasgow, at the age of 68. Although essentially he practised general medicine and surgery, he once held the post of surgeon to the Glasgow Eye Infirmary, but resigned many years ago. For seventeen years he was surgeon to the Glasgow Western Infirmary. At the beginning of war he was posted, with the rank of Lieut.-Colonel, to the Fourth Scottish General Hospital at Stobhill, near Glasgow.

We learn from the September issue of *España Oftalmológica* that Dr. Rodriguez Mendez, of Barcelona, died on September 20. In addition to his work in ophthalmology, he edited the *Catalan Medical Gazette.*

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Honours

THE President of the French Republic has conferred the Légion d'Honneur upon Sir Michael Thomas Yarr, K.C.M.G., C.B., A.M.S. The C.B.E. has been bestowed upon A. W. Ormond.

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Appointments

SIR WILLIAM T. LISTER, K.C.M.G., has been appointed surgeon to the Royal London Ophthalmic Hospital. T. W. Letchworth has been appointed assistant surgeon to the Royal Eye Hospital. A. E. Reynolds has been appointed assistant ophthalmic surgeon to the Miller General Hospital, Greenwich. A. C. Roper has been appointed honorary consulting surgeon and honorary governor to the West of England Eye Infirmary, Exeter, and G. P. Hawkins has been appointed surgeon to the same institution. H. W. Archer-Hall has been appointed assistant surgeon to the Birmingham and Midland Eye Hospital.

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Ophthalmological Society of Bombay

THE ophthalmic surgeons of Bombay have formed an ophthalmological society, of which the first officers are: president, Col. G. McPherson; vice-president, G. B. Prabhakar; secretary and treasurer, K. S. Ghaswala.

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Ophthalmological Society of Egypt

THE annual meeting of the Ophthalmological Society of Egypt will take place at the Pathological Museum, School of Medicine, Kasr el Ainy Street, Cairo, on March 5, 1920. Officers who are interested in Ophthalmology are invited to attend. Any Officer desirous of making a communication at the meeting should send *résumé* of his paper not later than first post on February 15, 1920, to the Honorary Secretary, the Ophthalmological Society of Egypt, c/o Department of Public Health, Cairo.

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Folkestone and Opticians

THE secretary of the Chamber of Commerce has addressed the following letter to the local public press:—

"SIR,—At the monthly meeting of this Chamber, held at the Town Hall on Tuesday evening last, July 28, the following Resolution, of which I was instructed to forward you a copy, was unanimously passed:—'That this Chamber deplores the fact that self-styled specialists, without statutory qualifications, should be able to visit Folkestone for the purpose of victimizing the public for their own pecuniary advantage, rather than for the public good, and this Chamber proposes to take suitable measures towards preventing such visits; and that copies of this resolution be sent to the local press, the Town Clerk, the British Optical Association, the Medical Defence Union, the Local Government Board, the British Medical Association, and the Medico-Political Union.'

I am, dear Sir, yours faithfully,

RICHARD WHITE."

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General Medical Council

AT a recent meeting of the General Medical Council a recommendation was moved by Dr. Norman Walker, on behalf of the Examination Committee, affirming that the Council would welcome further communications from the licensing bodies, showing how far their regulations were in accord with the Council's recommendation in regard to the teaching of ophthalmology. This matter is discussed in the Annotations.

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Oxford Ophthalmological Congress

A DISCUSSION on "Perimetric Methods" will be held at the meeting of the Congress in July, 1920.